Jurnal
Al-Imam
Journal on Islamic Studies, Civilisation and Learning Societies,
Al-Imam: Vol. 3 (2022), pp. 11-18

IDRIS

Moderate Way Implementing Rukyah and Hisab to Determine A New Moon in Ramadan

Abdullah A Afifi[a,b,*], Afifi Fauzi Abbas[b]

[a]*BMAIS International Open University (IOU)*
[b]*IDRIS Darulfunun Institute, Payakumbuh*

Date of publication: 22 December 2022

Abstract :
Rukyah and hisab have already become critical discussions in Islamic knowledge. Controversy arose, and the debate continues today. Some scholars prefer to use one method over another, while some scholars today try to offer moderate approaches for better solutions and understanding. Scholars claim both rukyah and hisab using the prophet Muhammad's hadith references. In comparison, a modest society is accessible to apply rukyah as their way to determine the new Ramadhan, and some complex cultures are multicultural, multi sects, or have a wide coverage area. This complexity will affect the observation process's difficulty, accuracy, and potential differences. This situation needs sensible solutions to determine the new Ramadhan. This paper tries to elaborate on each approach used by scholars and authorities, its preconditions, and how the approaches should be moderated to determine the new moon optimally by developing a strategy that gives mutual feedback to each method.

Keywords: *rukyah hisab, industrial revolution, Islamic calendar, global time, operating procedure*

1. Introduction

Fasting is one of the ancient sacred activities done by multiple cultures worldwide. In Islam, there are guidelines on how to do it. Islamic fasting is a physical activity and spiritual exploration of obedience and worship to God. Ramadan's fasting starts and ends by confirming the sighting of the new moon (Salih Al-Fawzan, 2012; Sayyid Sabiq, 2017).

One of the critical discussions about fasting during Ramadan was dating the new month of Ramadan. Observing the astronomical phenomenon of the new moon that emerges every month becomes a crucial point of this discussion. The primary way to determine the new moon is by naked-eye observation (*rukyah al-hilal)*. Direct observation (*rukyah al-hilal*) is primarily the safest way to commence the new moon. Still, some obstacles hinder the observation in critical conditions, especially in cloudy tropical and condensed regions. Early scholars have faced this situation for centuries, making astronomical calculations based on the scientific observation of the orbit cycle of sky

---

Author note: This part of paper was prepared for Fiqh 201 course, BMAIS programme, International Open University.
[*]Corresponding author: *abdullah@darulfunun.id*

© 2022 The Authors. Published by IDRIS Darulfunun Institute, Payakumbuh.
Open access online at pub.darulfunun.id

objects arise and become significant contributions to determining a new moon (Azhari, 2007; Ebrahim, 2003; E. Hidayat, 2019; Ilyas, 2016).

This article will elaborate on contemporary *rukyah* and *hisab* issues that arise due to the rapid spread of Muslims that settle in any region of the earth. Islam is a scientific religion that provides guidance based on scientific facts and the correct explanation. Islam puts Quran and Sunnah as the central ethical resource. Islam ensures contextually and contemporarily practicable with the guide authorized scholars or regional bodies (Abbas, 2010). Islam also gives some flexibility to be practised by Muslims based on their specific conditions. The analysis and discussion will arrange into three main scopes: a) the references (*daleel*) from Quran-Sunnah, 2) the fatwa from ulama or authorities bodies of the fatwa, and 3) contemporary discussion and alternatives (Afifi, 2021; Afifi, Abbas, & Ismail, 2019).

2. Analysis & Discussion

2.1. The references (daleel) from Quran-Sunnah about determining new Ramadan

Either *rukyah* or *hisab* scholars refer to the same hadits as primary reference *(daleel)*. From prophet Muhammad (PBUH) from Ibn Omar: “The (lunar) month (can be) twenty-nine nights (i.e., days), so do not fast until you see the new moon and do not breakfasting until you see it. And if the sky is overcast, then you have to estimate the period. (Muslim:1080e, Bukhari 1906)”.

On this hadits, it mentions: a) the probability the month of Sha’ban (before Ramadan) was 29 days or 30 days; b) To ensure the number of days to determine the end of the month of Sha’ban is by seeing a new moon, this is a guide to do *rukyah*; c) this guide also a way to determine the end of Ramadan by determine the new moon in Shawwal; d) the last is an alternative provided by the prophet (PBUH) if there is some overcast or difficulty on seeing new moon, by using estimation or calculation, this use as *daleel* for using or permission to do the *hisab*.

The other hadits by the prophet (PBUH) that narrated from Abu Huraira: "Start fasting on seeing the crescent (of Ramadan) and give up fasting on seeing the crescent (of Shawwal), and if the sky is overcast (and you cannot see it), complete thirty days of Sha'ban." (Bukhari 1907).

Both narrated hadits, either by Ibn Umar or Abu Hurairah, were used as references by scholars for the *rukyah* and *hisab* methods. The difference is in how the scholars elaborate and take the legal point of view (*fatwa)* related to it (Azhari, 2007; Izzuddin, 2007).

Some scholars elaborate the words “estimate the period” *(faaqduruu)* on hadits (Bukhari 1906) by calculating and estimating the cycle of the moon. While the jumhur *salaf* and *khalaf* (Abu Hanifah 150H/767M, Imam Syafii 204H/820M, Imam Malik 179H/795M, etc.) elaborate *“faaqduruu”* by completing the month into 30 days. During the period of Abbasid, scholars interpreted *“faaqduruu”* with a broader meaning by estimating or calculating the days, referring to hadits Ibn Omar. Other scholars, like an-Nawawi (676H/1278M), mentioned that *hisab* is not more straightforward for ordinary people to use (Abdul Niri, Mohd Nawawi, Ismail, Abdul Wahab, & Ahmad Zaki, 2012).

This scholarly work progress guided us to understand that the *rukyah* still argues to become the modest way to determine a new moon. While *hisab,* even legitimately accepted, can be used to verify a new moon. Still, it is not a method that ordinary people can easily understand. The expertise and excellency of that knowledge become another topic of discussion.

There are two common ways how the scholars elaborate *“faaqduruu.”* The first is called *istikmal,* which completes the current month in 30 days, and the second is advanced calculation and estimation. Further, a computer's contemporary advanced method of analysis can already generate simulations for years ahead (Abdul Niri et al., 2012; Syamsul Anwar, 2012).

Another scholar like al-Qardawi brings another scope of discussion that the *hisab* is certain *(qathi)* while *rukyah* is more uncertain

(Wahidi & Musataklima, 2021). From further findings, we can understand that certainty is more likely to depend on the expertise and the specific condition to do at that time. With high respect, the scholarly debate around *rukyah* and *hisab* is rich and leans toward Quran and Sunnah.

In some regions of Islamic communities, there are exclusive local thoughts *(urf)* related to *rukyah* and *hisab*, like observing natural phenomena besides the moon cycle. Even though, in some way, the new moon cycle affects natural occurrences. Still, this method that relies on other natural events is not legitimate due to no *daleel* that supports it (Izzuddin, 2008).

The discussion, which is more legitimate on comparing *rukyah* and *hisab,* becomes unproductive. With convincing arguments, each scholar positioned the conditions to choose one another—something in recent days ineffective since many experts among the scholars. The late scholars (Muhammad Bakhit al-Muti' 1354H/1935M, Ahmad Shakir 1377H/1958M, Tantawi Jawhari 1358H/1940M, Mustafa Ahmad al-Zarqa 1419H/1999M) argue on some situations *hisab* result can eliminate *rukyah.*

The pra-conditions need to discuss the possibility for one outcome to annul another, but still, the intense arguments agreed both procedures need to be done and support each other. Both techniques, *rukyah,* and *hisab* are more likely to look as an alternative and verification for another.

With various interpretations of the hadits, the scholars agreed on in general conclusion:

a) *Rukyah* and *hisab* was the method taught by the prophet Muhammad (PBUH) to determine the new moon.

b) As *rukyah* mentioned earlier, it does not mean *rukyah* is better than *hisab*, and vice versa. Scholars should take preventive and precaution by undertaking *rukyah* and *hisab* as integrated approaches to support the result of one another (Sulaiman & Hassan, 2018).

c) Scholars can do *hisab* earlier and use it to predict and prepare the procedure of *rukyah*. Does the direct observation need special tools or methods, or can it be done as usual? If the condition does not support *rukyah* to get the result, *hisab* result can be more legitimate than before. Furthermore, *rukyah* should be a verification tool for *hisab* to be calibrated when using the *hisab* result.

d) The legitimacy power of *rukyah* and *hisab* occurred with the condition surrounding it. *Rukyah* can be more legitimate if the observer sees the moon with the naked eye. The modest method was adopted in many of the Islamic worlds before, including Saudi Arabia (*imkanur rukyah* without limitation on height). After some period, Saudi Arabia invested in research and built an observatory to implement the more appropriate way, and keep evolving until now *(wiladah al-hilal)* (Aris, 2016).

2.2. Evolution of hisab and astronomy in the Islamic world

This issue eventually arises in history, not just the different interpretations of the scholars that make a difference. The knowledge rises because of the need for technology to solve the government issue. The tax, zakah, harvest, strategic planning, the expedition, etc., were leaned back on the calendar. Regional socio-politics is also related. The need for this knowledge occurred with the chance for civilization to flourish (Arifianto, Nugroho, Kiswanto, & Prijanto, 2011).

The rise of calculating the moon cycle was needed when Islam spread around during the period of Abbasiyah. Al-Fazari, a Muslim Persian scholar, took the scientific work to make Astrolabe from translated Greeks references in the period of Abbasid Harun al-Rasyid and Abdullah al-Makmun *(Baitulhikmah)*. Al-Farghani continued the work of al-Fazari, but until it was adequate to support policy and fatwa by the time of al-Biruni. Al-Biruni serves Mahmud of Ghazni's expansion to India with this knowledge (Hayton, 2012; Rausi, 2019).

The travel and mobility of Muslims made the issue a different position when they could not see the new moon. When they tried to estimate 30 days, they were already in a different location. This Astrolabe was a tool that helped authorities to give a solution to an essential issue in the Islamic world, about the time of praying, Mecca *qibla* direction, and the new moon to determine the new and end of Ramadan. These advantages made Muslim ruler expansion easier because they could see that knowledge and technology made them superior or competitive enough with others (Afifi, 2011). *Hisab* that related to sciences and innovation became one of competitiveness and complication for the people, that's why only in an advanced civilization that provides a good ecosystem of learning society that can go through this complexity a cutting-edge science and technology (Afifi, Arifin, & Kiswanto, 2019).

The Astrolabe research and contribution were significant in the era of Seljuk rulers Alp Arslan and Jalaluddin Malik Shah, with their vizier Nizam al-Mulk. They build an observatory under the supervision of Omar Khayyam and his assistant al-Jazari. The observatory made significant progress in revising the Persian lunar-based calendar system due to the early days and late feasting period that made people distressed to pay tax or zakah (Thomann, 2021). The other bodies built during this period were Nizamiyah schools supervised by al-Ghazali (Ash-Shallabi, 2020). Religious scholars (al-Ghazali, as-Shirazi, al-Juwaini al-Haramain, etc.) know the *hisab* (sciences) research on that period. The authorities (Jalaluddin Malik Shah and Nizam al-Mulk) did magnificent work correcting the Persian calendar to solve the real issue faced by people. The *rukyah* and *hisab* were used wisely in this period, reminding us that *hisab* needs to be evaluated regularly for accuracy.

2.3. *The controversy around rukyah and hisab*

As this issue of determining a new month, every Ramadan became an annual discussion. Some authorities that consist of representatives of societies or schools choose firmly between *rukyah* or *hisab* methods. While based on hadits narrative before, it mentions the main objective is to determine the new moon that can be defined by direct observation *(rukyah)* and by estimation or calculation precondition *(hisab)* as an alternative. From that hadits, easy to understand the method is not just an option but also a sequential procedure. Each technique today has been developed and enriched by adding more technological approaches. The authorities also need to consider the social effects of cultural festivals in some Asian countries that induce mass mobilization from one city to another. The deal to determine the new and end of Ramadan should plan very well.

Four schools of fiqh *(mazhab)* consider *rukyah* an obligation (Hanapi & Hassan, 2015; Matthews, 2014). Other scholars like Ibn Taymiyyah, Ibn Qutaybah, Ibn Surayj, and Taj al-Din al-Subki support the estimation of the new moon *(hisab)* because it can provide accurate results and can be used to determine the new moon. While scholars strictly mention *rukyah* as the first attempt but sometimes see it as the only way to see the new moon is more because understanding the hadits is stressed and demanded in that way. While others like Sa'd al-Din Mas'ud ibn Umar al-Taftazani also explain that ordering *rukyah,* as mentioned above, is not a legal requirement. All Muslim jurists agree on the legal need for fasting during Ramadan, either by the *rukyah* or *hisab* method (Syamsul Anwar, 2012; Shah, 2009).

For example, in Indonesia (Muhammadiyah), there is a shifting trend of fatwa about the legal standing of *rukyah* and *hisab*. In the first stage, Muhammadiyah put *rukyah* as more legitimate than *hisab*. Then shifting opinions make *hisab* equal to *rukyah* (Imron, 2014). Understanding this without understanding the hadits will be challenging to comprehend that *hisab* has the same legal standing as the *rukyah*. What should be understood is that there are situations where *hisab* legal status needs to be verified to put the result of *hisab* legitimate, which is in conditions where *rukyah* can not achieve the result. For every method to be legitimate depends on some of the circumstances related to each of them. By this argument, Muhammadiyah feels *hisab* is valid because there are situations where the observer can not see the new moon. Vice versa, where the new moon can be clarified, while the *hisab* has delayed results, the *hisab* result (and formula) was verified by *rukyah*, and the estimation needs to redefine (Abbas, 2015). The issue of *rukyah* and *hisab* should not be in which one is better, but how both can help us determine the new moon.

Further, Muhammadiyah argues with the current situation where *rukyah* has become hard to do. At the same time, *hisab* made consistent and reliable results, which made *hisab* more reliable than *rukyah*. Muhammadiyah stands for *rukyah* and *hisab* was a tool *(wasilah)* to support the main worship *(shaum)*. That is why we need to utilize it if there is a better way *(wasilah)* to achieve the result (Abbas & Afifi, 2020; Syamsul Anwar, 2012). Scholars from Nahdlatul Ulama also suggest using hisab in the earlier prediction to preparing the observation process (Ulum, 2021). From this, we can see how the knowledge is progressing from each side.

The limitation of *rukyah* also mention by Muhammad Odeh, who try to analyze the simulation of getting the result of the new moon for Ramadan in the years 1954-1999 (47 months) by three conditions;

a) 1% (1 month) observers possible to see the new moon with the naked eye,

b) 1% (1 month) potential to see the new moon with the help of the telescope,

c) 60% (28 months) impossible to see the moon, but the new moon is still determined by seeing it (the possibility is the result is late, or it was misguided by another sky object).

d) 36% (17 months) theoretically can not see the moon (Nashirudin, 2011).

There are times when the observer can see the moon clearly and times when it cannot. Moreover, the *hisab* method keeps evolving as scholars discover new facts about the orbits of astronomical objects, making their calculations more accurate today (Djamaluddin, 2001; Izzuddin, 2015; Shah, 2009). Nevertheless, *hisab* calculation needs to be adjusted periodically to maintain accuracy (Sirna Anwar, Omar, & Awang, 2016; T. Hidayat et al., 2010; Rodzali & Man, 2021; Royyani, Mufid, Ni'am, Azizi, & Abidin, 2021).

Rukyat and *hisab* today already adapted and integrated, something that said *hisab* method also refers to *rukyat* on the day of observation. Like *rukyat* today, *rukyat* also adapts to estimate the day and possibility of seeing the moon. The other potential issue that hinders for a long time is the *wilayat al-hukm* to global position-based latitude altitude, especially in northern or southern the world (Tarabishy, 2014).

***Rukyah hisab* criteria**	**Country/region**
Imkanur Rukyah with conditions: a) Height not less than 5° (Istanbul Conference 1992) / 3° (Ministers agreement Indonesia, Malaysia, Brunei and Singapore 2021) b) Radius not less than 8° on sunset (Istanbul Conference 1992) / 6.4° (Ministers agreement Indonesia, Malaysia, Brunei and Singapore 2021) (Azhari, 2021; Mohd Nawawi, Man, Zainuddin, Abdul Wahab, & Zaki, 2015; Rodzali & Man, 2021; Wahidi, Yasin, Kadir, Rouf, & Haq, 2021; Zainuddin & Nawawi, 2021)	Nahdlatul Ulama Indonesia, Malaysia, Brunei, Singapore, etc.
Wujudul Hilal / Wiladah al-Hilal Syar'iyyah with conditions: a) Moonset after sunset b) Conjuction *(ijtimak qablal ghurub)* (Aris, 2016; Azhari, 2021)	Saudi Arabia , UAE, Muhammadiyah Indonesia, Persis Indonesia, etc.

Table 1. *Rukyah hisab progress*

2.4. *Improving technology and developing procedures for a moderate solution*

Estimation *(hisab)* preparation is not likely to direct observation *(rukyah)* which can do by just observing the sky with minimal requirements. To make the integration of *hisab* and *rukyah* can succeed, it is necessary to prepare the preconditions of each approach while letting the decision be the last final stage (Eddine, 1998). On this day, the *hisab* can be done relatively quickly with the help of technology and computerization, and *rukyah* also be done simply with the use of telescope technology.

The *rukyah* itself has many preconditions and complex variables. The places and situations of the observatory also determine when and how the best observation can give the best result (Sultan, 2006). Sightseeing succeeds if the new moon is on condition possible to see, the type of telescope used, and the situation of the sky. That makes *rukyah* not seem easy to do. There are other situations with the earth's condition, climate change, speed rotation, latitude position and more (Abur-Robb, 2017; McNaughton, 1997; Tarabishy, 2014). Even the Odeh data mention how the possibility of seeing the moon is so slight. This possibility is the perfect time to verify and calibrate the calculation.

This discussion stitches the argument and discusses how direct observation (*rukyah*) and estimation (*hisab*) as integrated approaches requiring precondition at each stage. Fiqh scholars furthermore can develop some requirements to describe that precondition. Scholars need to build standard procedures that describe the situation clearly and integrate. As a tool, *hisab* will use for preparations and verification. The view to use *hisab* in the preparation process is mention also by NU (Ulum, 2021). In this situation, if the observer can see the new moon, the issue is solved, but if the observer can not see the new moon, *hisab* result should be legitimate if the result mentions it on that day.

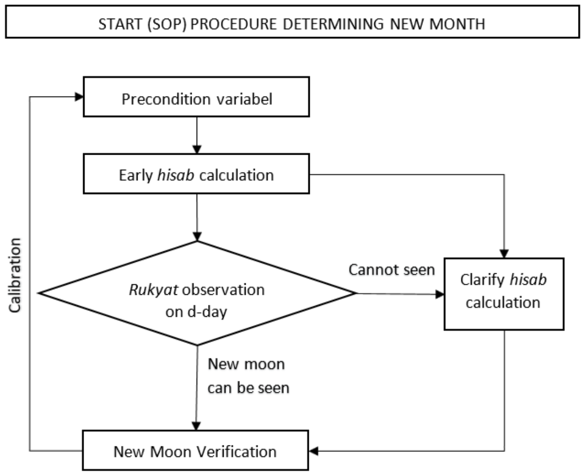
START (SOP) PROCEDURE DETERMINING NEW MONTH
Precondition variabel
Early *hisab* calculation
Rukyat observation on d-day
Cannot seen
Clarify *hisab* calculation
New moon can be seen
New Moon Verification
Calibration

Figure 1. *Procedure for moderating rukyah and hisab*

Some regions have already upgraded their knowledge and technology in the decision-making strategy. This move will affirm the possibility of understanding to determine the new moon and observations process (Azhari, 2021; Ebrahim, 2003; Ilyas, 2016; Laila, 2012). Like ICOP (Islamic Crescents Observations Project) with an online record of sightseeing of the new moon worldwide, supported by massif voluntary scholars worldwide. Indonesia with BMKG (Badan Meteorologi, Klimatologi, dan Geofisika) online website that gives the public access to new moon sightseeing in website hilal.bmkg.go.id. With this progress in data sharing, the realization of the single global calendar *(takwim uhadi)* based on geolocation will revise the concept of *wilayat al-hukm*.

Institutions	Website for sigtseeing
ICOP UAE	astronomycenter.net
BMKG Indonesia	hilal.bmkg.go.id

Table 2. *Website for moon sightseeing*

Developing a procedure diagram will help us understand the process and build an alternative. Scholars can adapt the system flow based on the particular time to verify one year calendar when determining a new moon for Ramadan and Syawaal. The observation moment is the perfect time to do correction and calibration.

3. Conclusion

Today neither rukyat nor hisab can be done separately. The approach and development of knowledge already push scholars to build moderate and integrated methodologies. As a result, many Islamic countries use accurate calendar systems for public or civil purposes. But there are still a lot of Muslim living countries that need valid alternatives. The precise estimation also helps reduce the uncertainty and will have a massive role in Muslims planning festive on Ramadan.

Direct observation *(rukyah)* and estimation *(hisab)* are integral to determining the new moon process. Either *rukyah* or *hisab* has preconditions that should discuss in sequence and parallel. The modest way to determine *rukyah* and *hisab* can be a solution, especially in some areas that not easy to see the new moon, and the approach also can be a solution for Muslims in minority areas or societies that are not familiar with *hisab*.

Furthermore, the research on of global Islamic calendar, *rukyah* and *hisab* method will expose the next issue to discuss on geolocation as an alternative for *wilayat al-hukm*.

References

Abbas, A. F. (2010). *Baik dan Buruk dalam Perspektif Ushul Fiqh*. Ciputat: Adelina Bersaudara.

Abbas, A. F. (2015). *Faham Agama Dalam Muhammadiyah*. Jakarta: UHAMKA Press.

Abbas, A. F., & Afifi, A. A. (2020). *Panduan Ringkas Berpuasa di dalam Islam: Fiqh Puasa dan Metode Falaq*. https://doi.org/10.31219/osf.io/4q58m

Abdul Niri, M., Mohd Nawawi, M. S. A., Ismail, K., Abdul Wahab, R., & Ahmad Zaki, N. H. (2012). Kesan Penggunaan Hitungan Astronomi Dan Alatan Moden Dalam Cerapan Hilal Di Malaysia: Satu Penelitian. *Jurnal Fiqh*, *9*(1), 45–64. https://doi.org/10.22452/fiqh.vol9no1.3

Abur-Robb, O. (2017). *The first sight of the Crescent on earth according to Yallop, SAAO and Odeh Criteria,, and the introduction of the Hijri Date Line as the Sunset Terminator Line of the opposite point of Mecca from its latitude*.

Afifi, A. A. (2011). *Analisis Kemampuan Industri Manufaktur Otomotif Mengacu Pada Pola Pengembangan Teknologi* (Universitas Indonesia). https://doi.org/10.13140/RG.2.2.16897.51045

Afifi, A. A. (2021). Understanding True Religion as Ethical Knowledge. *AL-IMAM: Journal on Islamic Studies, Civilization and Learning Societies*, *2*, 1–5.

Afifi, A. A., Abbas, A., & Ismail, I. (2019). Future Challenge of Knowledge Transfer in Shariah Compliance Business Institutions. *International Colloquium on Research Innovations & Social Entrepreneurship (Ic-RISE) 2019*.

Afifi, A. A., Arifin, N., & Kiswanto, G. (2019). Industrial Maturity Development Index: An Approach from Technology-driven Resources. *International Colloquium on Research Innovations & Social Entrepreneurship (Ic-RISE) 2019*.

Anwar, Sirna, Omar, K. M., & Awang, M. S. C. (2016). The relevance of using the moon's age as an alternative in imkanur rukyah criteria. *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives*, *42*(4W1), 209–215. https://doi.org/10.5194/isprs-archives-XLII-4-W1-209-2016

Anwar, Syamsul. (2012). Kontroversi Hisab dan Rukyat. In *Hisab Bulan Kamariah: Tinjauan Syar'i Tentang Penetapan Awal Ramadlan, Syawwal Dan Dzulhijjah* (pp. 1–20). Yogyakarta: Suara Muhammadiyah.

Arifianto, A., Nugroho, H., Kiswanto, G., & Prijanto, B. (2011). The Industrial Manufacturing Maturity Model (IM3) Based On State of the Arts of Technology Development. *Proceeding of the 12th International Conference on QiR (Quality in Research)*. Bali: Universitas Indonesia.

Aris, N. (2016). Dinamika Kriteria Penentuan Awal Bulan Qamariah Dalam Penanggalan Umm Al-Qura' Saudi Arabia. *Al-Ahkam Jurnal Ilmu Syari'ah Dan Hukum*, *1*(1). https://doi.org/10.22515/alahkam.v1i1.97

Ash-Shallabi, A. M. (2020). *Syafi'iyah & Asy'ariyah: Sejarah, Hubungan & Perkembangan di Dunia Islam*. Solo: Al-Azhar.

Azhari, S. (2007). *Ilmu Falak Perjumpaan Khazanah Islam dan Sains Modern*. Yogyakarta: Suara Muhammadiyah.

Azhari, S. (2021). Cabaran Kalendar Islam Global di Era Revolusi Industri 4.0. *Jurnal Fiqh*, *18*(1), 117–134.

Djamaluddin, T. (2001). *Calendar Conversion Program Used to Analyze Early History of Islam*. Bandung.

Ebrahim, A. (2003). Crescent Observation and The Visibility of The Hilaal. *3rd Islamic Astronomical Conference*. Amman.

Eddine, H. K. (1998). Internationalization of New Moon Sightings for the Islamic Lunar Month. In *Proceedings of the IIIT Lunar Calendar Conference* (pp. 0–6).

Hanapi, D. M. S., & Hassan, D. S. A. (2015). Basis for Using the Rukyah Method for Determining the Arrival of Ramadan and Syawal in Brunei Darussalam. *Journal of Islamic Studies and Culture*, *3*(2), 12–22. https://doi.org/10.15640/jisc.v3n2a2

Hayton, D. (2012). *An Introduction to the Astrolabe*. Retrieved from https://dhayton.haverford.edu/wp-content/uploads/2012/02/Astrolabes.pdf

Hidayat, E. (2019). Sejarah Perkembangan Hisab Dan Rukyat. *Elfalaky*, *3*(1), 56–70. https://doi.org/10.24252/ifk.v3i1.9777

Hidayat, T., Mahasena, P., Dermawan, B., Herdiwijaya, D., Setyanto, H., Irfan, M., … Santoso, A. (2010). Developing information system on lunar crescent observations. *ITB Journal of Science*, *42 A*(1), 67–80. https://doi.org/10.5614/itbj.sci.2010.42.1.6

Ilyas, M. (2016). Unified World Islamic Calendar Sharia', Science, and Implementation Through Half a

Century.". *Proceedings of the International Falak Trial in the …*, *1*, 1–8. Retrieved from http://www.ukm.my/ancor/wp-content/uploads/2016/09/Prosiding-Persidangan-Antarabangsa-Falak-di-Dunia-Islam.pdf

Imron, A. (2014). Pemaknaan Hadis-Hadis Hisab-Rukyat Muhammadiyah Dan Kontroversi Yang Melingkupinya. *Jurnal Studi Ilmu-Ilmu Al-Qur'an Dan Hadis*, *15*(1), 1. https://doi.org/10.14421/qh.2014.15101

Izzuddin, A. (2007). *Fiqih Hisab Rukyat: Menyatukan NU dan Muhammadiyah dalam Penentuan Awal Ramadhan, Idul Fitri dan Idul Adha*. Jakarta: Erlangga.

Izzuddin, A. (2008). Dinamika Hisab Rukyat Di Indonesia. *Istinbath*, *12*(2), 248–273.

Izzuddin, A. (2015). Hisab Thinking of Rukyah Classic (Study on the Thinking of Muhammad Mas Pemikiran Hisab Rukyah Klasik (Studi Atas Pemikiran Muhammad Mas Manshur al-Batawi). *Jurnal: Hukum Islam*, *Vol.13. No*, 575.

Laila, N. (2012). Algoritma Astronomi Modern dalam Penentuan Awal Nilam Qamariah (Pemanfaatan Komputerisasi Program Hisab dan Sistem Rukyat On-Line). *Jurisdictie*. https://doi.org/10.18860/j.v0i0.2168

Matthews, Z. (2014). *The ruling for sighting the moon in Ramadan according to the four madhabs : Calculation versus physical sighting*. New South Wales.

McNaughton, D. (1997). A Universal Islamic Calendar. *Hamdard Islamicus*, *XX*(1).

Mohd Nawawi, M. S. A., Man, S., Zainuddin, M. Z., Abdul Wahab, R., & Zaki, N. A. (2015). Sejarah Kriteria Kenampakan Anak Bulan di Malaysia (History of the Criteria for Lunar Crescent Visibility in Malaysia). *Journal of Al-Tamaddun*, *10*(2), 61–75.

Nashirudin, M. (2011). Sistem penanggalan Hijriah Mohammad Shawkat Odeh. *Ijtihad : Jurnal Wacana Hukum Islam Dan Kemanusiaan*, *11*, 199. https://doi.org/10.18326/ijtihad.v11i2.199-217

Rausi, F. (2019). Astrolabe; Instrumen Astronomi Klasik Dan Kontribusinya Dalam Hisab Rukyat. *Elfalaky*, *3*(2), 120–137. https://doi.org/10.24252/ifk.v3i2.14149

Rodzali, M. Z., & Man, S. (2021). Relevansi Takwim Uhadi Dengan Syarat-Syarat Ditetapkan Kongres Istanbul 2016 Bagi Takwim Hijri Global. *Online Journal of Research in Islamic Studies*, *8*(1), 1–37.

Royyani, M. A., Mufid, A., Ni'am, M. I., Azizi, A. Q., & Abidin, A. A. (2021). Shahadah 'Ilmy; Integrating Fiqh and Astronomy Paradigm in Determining The Arrival of Lunar Months in Indonesia. *Al-Ihkam: Jurnal Hukum Dan Pranata Sosial*, *16*(2), 503–524. https://doi.org/10.19105/AL-LHKAM.V16I2.5320

Salih Al-Fawzan. (2012). *A Summary of Islamic Jurisprudence*. al-Maiman Publishing House.

Sayyid Sabiq. (2017). *Fiqh Us Sunnah*.

Shah, Z. A. (2009). *The Astronomical Calculations and Ramadan: A Fiqhī Discourse*.

Sulaiman, N. A. A., & Hassan, S. A. (2018). The Application of Rukyah and Hisab in Determining the Starting Dates of the Months of Ramadhan and Syawal in Thailand. *International Journal of Academic Research in Business and Social Sciences*, *8*(4), 770–783. https://doi.org/10.6007/ijarbss/v8-i4/4060

Sultan, A. H. (2006). "Best Time " for The First Visibility of The Lunar Crescent. *The Observatory*, *126*(1191), 115–118.

Tarabishy, M. N. (2014). *Salat / Fasting Time in Northern Regions*.

Thomann, J. (2021). *The institution of the Jalālī calendar in 1079 CE and its cohabitation with the older Persian calendar*.

Ulum, M. (2021). Fatwa Ulama Nu (Nahdlatul Ulama) Dan Muhammadiyah Jawa Timur Tentang Hisab Rukyat. *Jurnal Keislaman*, *1*(2), 244–272. https://doi.org/10.54298/jk.v1i2.3369

Wahidi, A., & Musataklima. (2021). Yusuf al-Qardawi and Hybrid Methods in Determination Beginning of the Months in Islamic Calendar. *The 4th International Conference on Law, Technology, Spirituality and Society (ICOLESS)*. Malang: Sharia Faculty UIN Maulana Malik Ibrahim Malang, Indonesia.

Wahidi, A., Yasin, N., Kadir, A., Rouf, A., & Haq, S. (2021). Implementation of the Mabims Criteria in Determining the Beginning of Islamic Month in Indonesia and Brunei Darussalam. *Proceedings of the International Conference on Engineering, Technology and Social Science (ICONETOS 2020)*, *529*(Iconetos 2020), 96–108. https://doi.org/10.2991/assehr.k.210421.016

Zainuddin, M. Z., & Nawawi, M. S. A. M. (2021). Kriteria Imkanur Rukyah Yang Baru 1443 Hijrah. *Webinar Falak Nusantara 1443H (Bulan Falak Malaysia) 1*, 1–21.